# Chapter VI. Monitoring and Evaluation

Monitoring and evaluating program efforts is important to ensure program effectiveness and accountability in the expenditure of public funds. Waukesha County currently uses a variety of methods to monitor and evaluate progress on program efforts, including land inventories, GIS/database maintenance, surveys, advisory committees, annual reviews and progress reports, and water quality monitoring.

Measuring progress for nonpoint pollution control programs has been identified as a serious challenge in several state legislative audits since the late 1980's. Past program efforts have focused on tracking best management practices installed to control nonpoint pollution and associated expenditures involved. Modeling has also been used to estimate pollution reduction accomplished by the installation of practices. Actually measuring changes in water quality is the best way to track progress, but it is very expensive. Also, due to the high number of variables involved in monitoring water quality, it is often difficult to interpret the data.

This chapter describes some of these efforts in more detail and how they will be used to monitor and evaluate the success of implementing plan activities.

## Citizen Surveys

One way to measure progress in information and education efforts is through random citizen surveys. The LRD has sponsored two such surveys in the past, one in 1994 and another in 2003. Both surveys tried to measure the level of understanding of nonpoint pollution and the impacts of urban runoff in particular. The LRD has compared and documented the results of these two surveys. In general, we found that public knowledge of nonpoint pollution has increased, but there is still much misunderstanding about storm sewers and where they discharge (29% correct answer). It is encouraging that more people believe that individuals are a key to solving nonpoint pollution problems now (30%) than in 1994 (23%). Given the expense of these types of surveys and the long-term nature of the changes being measured, it is not anticipated that additional surveys will be conducted within the 5-year planning horizon of this plan.

Another form of survey that is done more regularly is a brief questionnaire of participants in a particular workshop conducted by the LRD. This is done at the completion of the workshop to get immediate feedback and suggestions for improvement. This will continue to be a standard part of LRD information and education program efforts.

## Water Quality Monitoring

Monitoring water quality can be a powerful tool for tracking long-term trends and "ground-truthing" assumed impacts of land use changes and pollution control practices installed. However, as noted above, it is very expensive and difficult to do. Citizen surveys show that over the past 10 years an equal number of people think water quality is getting better versus getting worse or staying the same. In general, there is such a shortage of water quality monitoring information available to the LRD that it is impossible to say who is right. One solution to this problem is to encourage volunteer citizen monitoring.

### Citizen Stream Monitors

For approximately the past four years, the LRD has been very active in encouraging citizen volunteer water quality monitoring of the streams in Waukesha County. The LRD, in cooperation with groups such as the Rock River Coalition, Pewaukee River Partnership, and Water Action Volunteers (WAV) have held training sessions to teach interested citizens how to monitor streams for temperature, turbidity, dissolved oxygen, stream flow and how to conduct biotic index and habitat assessments. The data

collected is entered into an internet accessible database that will be useful for monitoring future trends in stream condition.

There are currently 20 teams of volunteer monitors around the county. The stream sites being monitored on a regular basis are listed in Table VI-1 and shown on Map VI-1. As staff time allows, the LRD will continue to help train volunteer teams and facilitate data collection.

**Table VI-1**
**Volunteer Stream Monitor Locations**

| Stream Name | Location | Watershed | Years Monitored |
|---|---|---|---|
| Golf Course Creek | Lac La Belle Dr. | Oconomowoc River | 3 |
| Battle Creek | Golden Lake Rd. | Oconomowoc River | 4 |
| Oconomowoc River | Beach Rd. | Oconomowoc River | 1 |
| Oconomowoc River | West Shore Dr. | Oconomowoc River | 1 |
| Mason Creek | Petersen Rd. | Oconomowoc River | 2 |
| Little Oconomowoc River | Petersen Rd. | Oconomowoc River | 2 |
| Ashippun River | Norwegian Rd. | Ashippun River | 2 |
| Bark River | Genesee Lake Rd. | Bark River | 2 |
| Bark River | Hillside Rd. | Bark River | 2 |
| Scuppernong Creek | Ice Age Trail | Bark River | 3 |
| Jericho Creek | Hwy LO | Mukwonago River | 3 |
| Genesee Creek | Carroll College property | Middle Fox River | 1 |
| Pebble Creek | Kame Terrace | Upper Fox River | 4 |
| Pebble Creek | Hwy TT | Upper Fox River | 4 |
| Brandy Brook | Hwy DT | Upper Fox River | 4 |
| Pewaukee River | Lindsay Rd. | Upper Fox River | 1 |
| Pewaukee River | Village Park near Capitol Dr. | Upper Fox River | 1 |
| Pewaukee Lake Outfall | Behind Main St. | Upper Fox River | 1 |
| Pewaukee River | Hwy M near Hammel Bldg. | Upper Fox River | 1 |
| Pewaukee River | Hwy J & I-94 | Upper Fox River | 1 |
| Pewaukee River | Hwy F | Upper Fox River | 1 |
| Coco Creek | Capitol Dr. | Upper Fox River | 1 |
| Coco Creek | Yench Rd. | Upper Fox River | 1 |
| Meadowbrook Creek | Hwy SS | Upper Fox River | 1 |
| Zion Creek | Oakton Rd. | Upper Fox River | 1 |

Source: Waukesha Co. LRD

## DNR Stream Monitoring

The Department of Natural Resources also conducts baseline monitoring of streams in Waukesha County. Department staff conducts fish collections, examine macroinvertebrates, and conduct habitat assessments at a number of locations around the county. Those sites that were evaluated from 2000-2004 are shown on Map VI-1. Streams projected to be monitored in the years 2006-2009 are included in Table VI-2.

**Table VI-2**
**Projected DNR Stream Baseline Monitoring Locations: 2006-2009**

| Stream Name | Stream Order | Sample Year | Fish Collection | Macroinvertebrates | Habitat |
|---|---|---|---|---|---|
| Scuppernong River | 2 | 2006 | x | | |
| Steel Brook | 4 | 2006 | x | | |
| Scuppernong River | 3 | 2006 | x | | |
| Scuppernong River | 3 | 2006 | x | | |
| Scuppernong River | 4 | 2006 | x | | |
| Steel Brook | 4 | 2006 | x | | |
| Scuppernong River | 1 | 2006 | x | x | x |
| Spring Brook | 2 | 2007 | x | | |
| Genesee Creek | 3 | 2007 | x | | |
| Genesee Creek | 2 | 2007 | x | | |
| Muskego Creek | 3 | 2007 | x | | |
| Fox River | 5 | 2007 | x | | |
| Pebble Brook | 3 | 2007 | x | | |
| Wind Lake Canal | 5 | 2007 | x | | |
| Muskego Canal | 4 | 2007 | x | | |
| Goose Lake Canal | 3 | 2007 | x | | |
| Mill Creek | 2 | 2007 | x | x | x |
| Bark River | 3 | 2008 | x | | |
| Bark River | 5 | 2008 | x | | |
| Bark River | 4 | 2008 | x | | |
| Duck Creek | 4 | 2008 | x | | |
| Bark River | 2 | 2008 | x | x | x |
| Mukwonago River | 3 | 2008 | x | | |
| Mukwonago River | 4 | 2008 | x | | |
| Jericho Creek | 1 | 2008 | x | x | x |
| Mason Creek | 2 | 2008 | x | | |
| Oconomowoc R. | 4 | 2008 | x | | |
| Oconomowoc R. | 3 | 2008 | x | | |
| Rosenow Creek | 1 | 2008 | x | x | x |
| Little Ocon. River | 2 | 2008 | x | x | x |
| Brandy Brook | 3 | 2009 | x | | |
| Pebble Creek | 3 | 2009 | x | | |
| Fox River | 5 | 2009 | x | | |
| Fox River | 3 | 2009 | x | | |
| Pewaukee River | 4 | 2009 | x | | |
| Poplar Creek | 3 | 2009 | x | | |
| Brandy Brook | 1 | 2009 | x | x | x |

Source: DNR

## United States Geological Survey Monitoring

The United States Geological Survey (USGS) is actively collecting water resources data on lakes and streams in Waukesha County and at numerous locations around Wisconsin. The type of data collected varies depending on program and project scope but includes historic and current streamflow on selected water bodies, water quality, and lake stage data. They regularly partner with other agencies and local interest groups to collect information on the condition of surface and groundwater resources.

Map VI-1 shows locations of USGS stream gage stations and lakes that have recently been monitored as part of an ongoing lake stage and water quality monitoring program. Water quality at each lake is monitored in February, April, June, July and August. Dissolved oxygen concentration, temperature, pH level, and specific conductance are determined in each lake. The objective of this long term monitoring program is to determine lake stage and water quality at these and other selected lakes in order to be able to detect chemical or biological changes that may take place over time.

More information on the variety of data collected by the USGS and the ability to view real-time stream gage data can be found at the USGS website: http://wi.water.usgs.gov/.

## Wisconsin's Self-Help Lake Monitoring Program

Wisconsin's Self-Help Lake Monitoring Program began in 1986 as one component of the Department of Natural Resources Lake Management program. The Program is designed as a data collection program on some of Wisconsin's 15,000 lakes and serves as a citizen education program about lakes in general. Each volunteer learns about his or her own lake by collecting the data and through a detailed report he or she receives at the end of the sampling season.

The Program was designed with six specific objectives in mind:

1. To teach citizen volunteers some concepts of basic limnology, how lakes "work" and to increase their understanding of the water quality of their lake in particular.
2. To teach citizens about basic lake sampling techniques, specifically how to use a Secchi disc carefully, regularly, and according to set procedures.
3. To document changes in lake clarity over time by tallying the data on a centralized computer system.
4. To differentiate between normal and seasonal variations in water clarity and long-term trends over time. In this way we can judge whether water clarity and, presumable water quality, is getting better, getting worse, or staying the same.
5. To compare the water clarity data for all of the lakes in the program on both a regional and statewide basis.
6. To collect data accurately over time in order to make sound lake management decisions.

Volunteer monitors may measure water clarity using a Secchi disk or may elect to do chemical analysis as well as water clarity readings. Lakes in Waukesha County with Self-Help Lake Monitoring ongoing are shown on Map VI-1 and listed in Table VI-3 below.

**Table VI-3**
**Self-Help Lake Monitoring in Waukesha County: 2005**

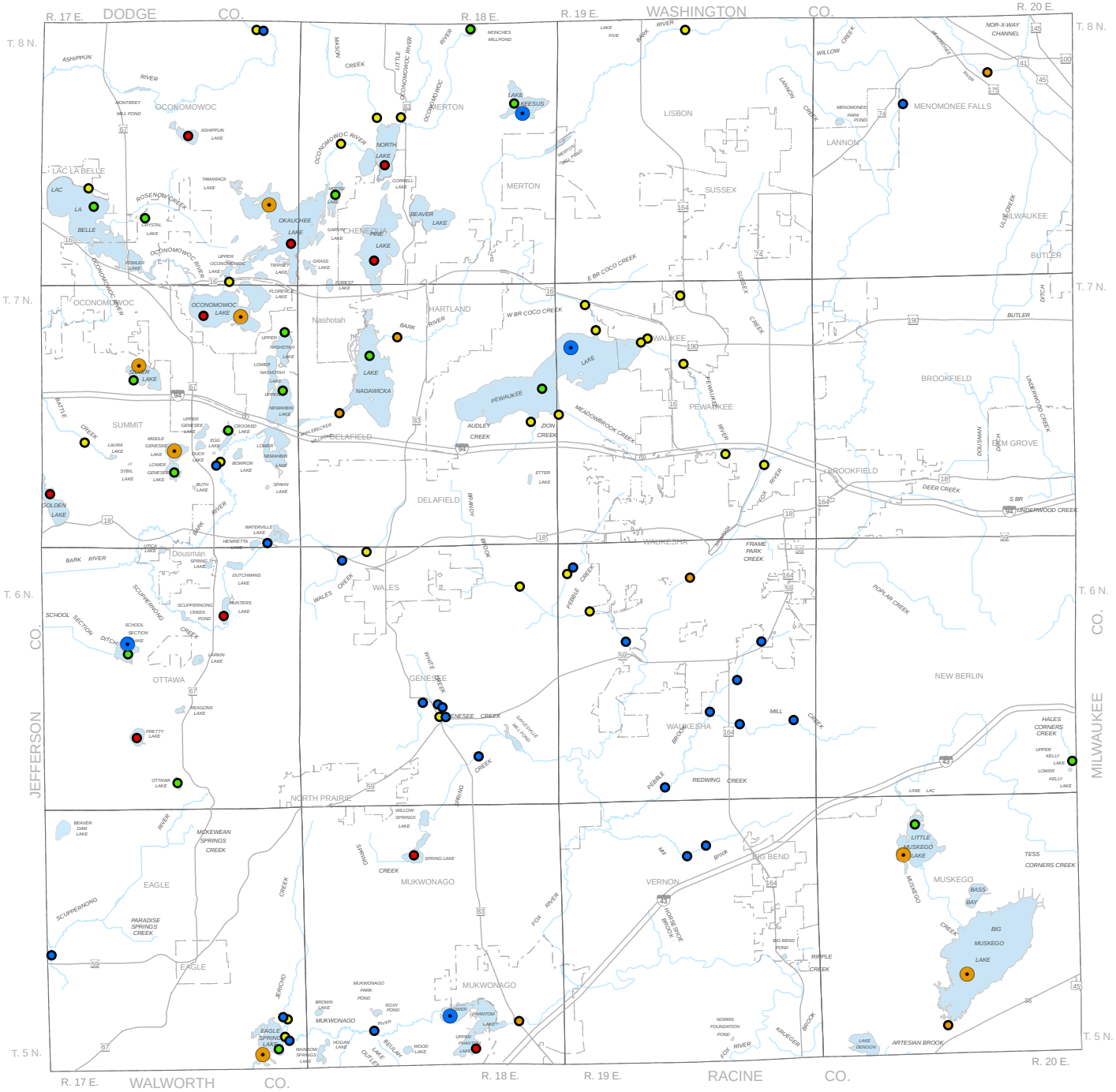
| Water Body | Self Help Monitoring | |
|---|---|---|
| | Chemical Monitoring | Secchi Depth Only |
| Ashippun Lake | x | |
| Crooked Lake | | x |
| Crystal Lake | | x |
| Eagle Spring Lake | | x |
| Genesee Lake, Lower | | x |
| Golden Lake | x | |
| Hunters Lake | x | |
| Keesus Lake | | x |
| Kelly Lake, Upper | | x |
| Lac La Belle | | x |
| Little Muskego Lake | | x |
| Monches Mill Pond | | x |
| Moose Lake | | x |
| Nagawicka Lake | | x |
| Nashotah Lake, Upper | | x |
| Nemahbin Lake, Upper | | x |
| North Lake | x | |
| Oconomowoc Lake | x | |
| Okauchee Lake | x | |
| Ottawa Lake | | x |
| Pewaukee Lake | | x |
| Phantom Lake, Upper | x | |
| Pine Lake | x | |
| Pretty Lake | x | |
| School Section Lake | | x |
| Silver Lake | | x |
| Spring Lake | x | |

Source: DNR

## DNR Lake Baseline Monitoring

Department of Natural Resources staff also conduct baseline monitoring of four lakes in Waukesha County each year. These lakes are monitored for total phosphorus, chlorophyll A, secchi depth, temperature profiles, dissolved oxygen profiles, pH profiles and conductivity profiles. Once a year in late summer these lakes are also monitored for color, alkalinity, nitrate, nitrite, total Kjeldahl-N, calcium and magnesium. The lakes with baseline monitoring include: Lake Keesus, Pewaukee Lake, Lower Phantom Lake and School Section Lake. These lakes are shown on Map VI-1.

**Map VI-1**
**Water Resources Monitoring Locations: 2005**




**Legend**

- DNR Lake Baseline Monitoring
- DNR Stream Baseline Monitoring Sites 2000-2004
- USGS Lake Monitoring
- USGS Stream Gauge Monitoring Station
- Citizen Stream Water Monitoring Sites

Self-Help Lake Monitoring:

- Secchi Depth Only
- Secchi Depth & Chemical Monitoring

N

0 1 2 Miles

0 4,000 8,000 12,000 16,000 Feet

Source: USGS, DNR & Waukesha County

## GIS/Database Tracking Systems

The LRD has developed a web-based database for tracking storm water permits and the long-term maintenance of storm water practices. This system will continue to be used to monitor compliance with the urban nonpoint performance standards and to generate annual reports of activity such as plans reviewed, permits issued, inspections conducted and enforcement action. In addition, a geographic information system (GIS) component will be completed to allow mapping of the sites where storm water BMPs are located and to track maintenance activities.

For the agricultural performance standards, a similar system is being developed to track compliance status by land parcel. This will be designed to record parcels inventoried, notices sent to landowners and any conservation measures carried out to bring a site into compliance. In addition, the LRD will be able to track progress on stream buffer installation accomplished through the Conservation Reserve Enhancement Program or by the Waukesha County Parks System Division as part of the Greenway Corridors Acquisition Program. The Greenway Program results in the dedication or acquisition of land adjacent to major stream resources in the county for a future trail system. By using the land use data layer and overlaying it with the data about land acquired for the Greenway corridor, it will be possible to identify where buffers are being installed along streams in the county. If a statewide buffer standard is adopted, this will be used to track compliance with that standard as well.

As noted earlier, the LRD has conducted a Transect Survey to determine general cropland erosion rates throughout the county. This methodology, developed by Purdue University and adapted with information specific to Wisconsin, requires a minimum number of sample points (500) to yield a statistically valid result. The last time the transect survey was conducted by LRD staff in 2001 there were 657 sample points. However, land development has continued at a steady pace throughout the county and many former sample points may have been eliminated. The LRD will consider conducting a similar process for tracking compliance on individual parcels.

## Plan Activity Tracking and Evaluation

Much of the progress on implementing the activities outlined in Chapter IV of this plan will be tracked simply by summarizing accomplishments in an annual report format. Whenever possible, standardized units of measurement will be utilized. Annual internal reviews will determine if changes are needed in the approach used, activities will be discontinued or new activities will be added to accomplish the stated objective. The LRD will use existing advisory committees to get periodic feedback on program efforts.

Annual progress reports will be compiled and forwarded to the Department of Agriculture, Trade and Consumer Protection and the Department of Natural Resources. Periodic updates will also be posted on the LRD website and incorporated into annual county budget documents. The results of the monitoring and evaluations described in this chapter, and conducted over the life span of this plan (2006-2010), will be used to improve the next land and water resource management plan.